JC10 Rec'd PCT/PTO 08 MAR 2002

FORM PTO-1390 (REV. 11-2000) U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (If known, see 37 CFR 1.5)
0020-4964P	10/070690 NEW

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/JP00/06048	September 6, 2000	September 8, 1999

TITLE OF INVENTION
FLUORINE-CONTAINING POLYMER AND ELECTRIC WIRE AND CABLE COATED THEREWITH

APPLICANT(S) FOR DO/EO/US
HIRAGA, Yoshiyuki; NAMIMATSU, Masayuki; IMANISHI, Hiroyuki; KOMATSU, Satoshi

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau. WO 01/18076
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   ✓ a. ☒ is transmitted herewith.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4)
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ✓☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☒ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 20. below concern document(s) or information included:

11. ✓☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98, Form PTO-1449(s), and International Search Report (PCT/ISA/210) with 12 cited document(s).
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ✓☒ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:
    ✓1. PCT/IB/308 and PCT/IB/304
    ✓2. PCT Substitute Claims Letter w/ Article 34 Amended Claims

U.S. APPLICATION NO (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
10/070690 NEW	PCT/JP00/06048	0020-4964P

21. ☒ The following fees are submitted:		CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5):			
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO.	**$1,040.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO	**$890.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO.	**$740.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4)	**$710.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4).	**$100.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =		**$ 890.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).		**$ 0**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total Claims	6 - 20 =	0	X **$18.00**	**$**	**0**
Independent Claims	2 - 3 =	0	X **$84.00**	**$**	**0**
MULTIPLE DEPENDENT CLAIM(S) (if applicable)		Yes	+ **$280.00**	**$**	**280.00**
TOTAL OF ABOVE CALCULATIONS =				**$**	**1170.00**
☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				**$**	**0**
SUBTOTAL =				**$**	**1170.00**
Processing fee of **$130.00** for furnishing the English translation later than ☐20 ☐30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				**$**	**0**
TOTAL NATIONAL FEE =				**$**	**1170.00**
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				**$**	**0**
TOTAL FEES ENCLOSED =				**$**	**1170.00**
				Amount to be: refunded	**$**
				charged	**$**

a. ☒ A check in the amount of $ **1170.00** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account. No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-2448.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to
Birch, Stewart, Kolasch & Birch, LLP or Customer No. 2292
P.O. Box 747
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Date: March 8, 2002

#28477

By _____
Andrew D. Meikle, #32,868

/sll

PATENT
0020-4964P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant:	HIRAGA, Yoshiyuki et al.		
Int'l. Appl. No.:	PCT/JP00/06048		
Appl. No.:	NEW	Group:	
Filed:	March 8, 2002	Examiner:	
For:	FLUORINE-CONTAINING POLYMER AND ELECTRIC WIRE AND CABLE COATED THEREWITH		

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, DC 20231

March 8, 2002

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

AMENDMENTS

IN THE SPECIFICATION:

Please amend the specification as follows:

Before line 1, insert --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/JP00/06048 which has an International filing date of September 6, 2000, which designated the United States of America.--

Docket No. 0020-4964P

IN THE CLAIMS:

Please amend the claims as follows:

7. (Amended) The electric wire or cable according to claim 3, wherein the contained alkali metal and alkali earth metal comprise at least one of potassium and sodium.

Docket No. 0020-4964P

REMARKS

The specification has been amended to provide a cross-reference to the previously filed International Application.

The claims have been amended to remove improper multiple dependencies and to place the application into better form for examination.

Entry of the above amendments is earnestly solicited. An early and favorable first action on the merits is earnestly solicited.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By _____ #28977
Andrew D. Meikle, #32,868

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ADM/sll
0020-4964P

Attachment: VERSION WITH MARKINGS TO SHOW CHANGES MADE

(Rev. 02/21/02)

Docket No. 0020-4964P

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims have been amended as follows:

7. (Amended) The electric wire or cable according to [anyone of claims 3, 5 and 6]claim 3, wherein the contained alkali metal and alkali earth metal comprise at least one of potassium and sodium.

DESCRIPTION

FLUORINE-CONTAINING POLYMER AND ELECTRIC WIRE AND CABLE COATED THEREWITH

FIELD OF THE INVENTION

The present invention relates to a fluorine-containing polymer, and an electric wire and cable coated therewith and, more particularly, to a fluorine-containing polymer containing a very small amount of an alkali metal and an alkali earth metal, and an electric wire and cable coated with the polymer.

RELATED ART

For example, tetrafluoroethylene (TFE)/hexafluoropropylene (HFP) copolymers prepared by the emulsion polymerization contain polymer main chains and polymer terminals which are unstable to heat and a shear force.

When a polymer having unstable polymer main chains and polymer terminal groups is used as a coating material for electric wire or cable, they are decomposed by heat or a shear force applied during coating to form cells and voids in the coating material and, therefore, a core wire can not be completely coated and insulating performances are lowered.

The kind of the unstable polymer terminal group varies depending on the polymerization method and the kind of a

polymerization initiator and a chain transfer agent. For example, when a conventional persulfate salt (for example, ammonium persulfate, potassium persulfate, etc.) is used as the polymerization initiator in the emulsion polymerization, carboxylic acid terminal groups are formed. It is known that these carboxylic acid terminal groups are a source of a volatile component produced during melting of the polymer.

Depending on the conditions on melting, groups such as olefin ($-CF=CF_2$) and acid fluoride (-COF) are sometimes formed at polymer terminals and these terminal groups can cause cells or voids in a final product of the polymer.

To solve these problems of cells or voids in the polymer caused by unstable main chains or unstable terminal groups, U.S. Patent No. 3,085,083 has proposed a method of stabilizing the unstable terminal groups by bringing a fluorine-containing polymer into contact with water at a temperature within a range from 200°C to 400°C (wet heat treatment), while Japanese Kokoku (Examined) Patent Publication No. 5 - 10204 (corresponding to U.S. Patent No. 4,626,587) has proposed a method of reducing the number of unstable main chains of a TFE/HFP copolymer by applying a high shear force to the copolymer in a twin-screw extruder and subjecting the resulting pellets to the fluorination reaction to improve the color tone of the pellets and to stabilize the unstable terminal groups.

U.S. Patent No. 3,085,083 also describes that a base, a neutral salt or a basic salt, which contains an alkali metal or an alkali earth metal, is added to increase a reaction rate in a wet heat treatment. When the wet heat treatment is employed as a method for a stabilization treatment of terminals, a base or salt of the alkali metal or alkali earth metal is often added.

Even if the fluorination reaction is conducted to stabilize terminals as in the latter case, when using potassium persulfate as a polymerization initiator, potassium remains as a residue of the initiator in the polymer.

However, when a fluorine-containing polymer prepared by using a compound containing an alkali metal or an alkali earth metal (for example, polymerization initiator) or a fluorine-containing polymer post-treated with a compound containing an alkali metal or an alkali earth metal contains a large amount of the alkali metal or alkali earth metal, electrical characteristics of an electric wire or cable coated with the fluorine-containing polymer are likely to be impaired and a core wire is likely to be corroded.

SUMMARY OF THE INVENTION

Thus, an object of the present invention provides a fluorine-containing polymer, which does not impair

electrical characteristics of a coated electric wire and does not corrode a core wire, although it contains an alkali metal or an alkali earth metal, and an electric wire or cable coated with the fluorine-containing polymer.

DETAILED DESCRIPTION OF THE INVENTION

According to the present invention, the object described above can be achieved by a fluorine-containing polymer comprising 70 to 95% by weight of tetrafluoroethylene, 5 to 25% by weight of hexafluoropropylene and 0 to 20% by weight of perfluoroalkyl vinyl ether, wherein a melt flow rate (MFR) (g/10 min., ASTM D2116) at 372°C is within a range from 0.1 to 100, and

the total content (ppm) of an alkali metal and an alkali earth metal does not exceed the value obtained by calculating from the melt flow rate (MFR) at 372°C according to the formula (1):

$$5.2 \times e^{0.125(MFR)} + 2 \qquad (1)$$

and exceeds the value obtained by calculating according to the formula (2):

$$0.35 \times e^{0.125(MFR)} \qquad (2),$$

and by an electric wire or cable coated with the fluorine-containing polymer.

Regarding the electric wire or cable, which is coated with a fluorine-containing polymer wherein the total content

(ppm) of an alkali metal and an alkali earth metal exceeds the value obtained by calculating according to the above formula (1), electrical characteristics are likely to be impaired and a core wire is likely to be corroded. On the other hand, in the case of a fluorine-containing polymer wherein the total content does not exceed the value obtained by calculating according to the above formula (2), unstable terminal groups are not sufficiently stabilized.

The fluorine-containing polymer used in the present invention is, for example, a copolymer comprising at least two monomers selected from the group consisting of tetrafluoroethylene, hexafluoropropylene and perfluoroalkyl vinyl ether.

The perfluoroalkyl vinyl ether is a vinyl ether represented by the formula (3):

$$CF_2=CFO(CF_2)_mF \qquad (3)$$

wherein m is an integer of 1 to 6, or a vinyl ether represented by the formula (4)

$$CF_2=CF[O-CF_2CF(CF_3)]_nOC_3F_7 \qquad (4)$$

wherein m is an integer of 1 to 4.

When the fluorine-containing polymer to be treated is a tetrafluoroethylene/hexafluoropropylene copolymer (FEP), the copolymer preferably comprises 72 to 96% by weight of tetrafluoroethylene and 4 to 28% by weight of hexafluoropropylene. When the fluorine-containing polymer

is a tetrafluoroethylene/perfluoroalkyl vinyl ether copolymer (PFA), the copolymer preferably comprises 92 to 99% by weight of tetrafluoroethylene and 1 to 8% by weight of perfluoropropyl vinyl ether. When the fluorine-containing polymer is a copolymer of tetrafluoroethylene and a plurality of perfluoroalkyl vinyl ethers (MFA), the copolymer preferably comprises 84 to 99.45% by weight of tetrafluoroethylene, 0.5 to 13% by weight of perfluoromethylvinyl ether, and 0.05 to 3% by weight of perfluoroalkyl vinyl ether having alkyl other than methyl, such as perfluoropropyl vinyl ether.

These polymers may be prepared by copolymerizing the other monomer in such amount that essential properties of each polymer are not impaired. Examples of the other monomer include hexafluoropropylene, perfluoroalkyl vinyl ether, ethylene, vinylidene fluoride and chlorotrifluoroethylene.

The fluorine-containing polymer is preferably prepared by the emulsion polymerization or suspension polymerization, particularly the emulsion polymerization. The polymerization conditions are the same as those in the case of the conventional emulsion polymerization or suspension polymerization, except that the amount of the compound containing the alkali metal or alkali earth metal (for example, a polymerization initiator, a chain transfer agent, a dispersant, etc.) is controlled so that the amount of the

alkali metal or alkali earth metal does not exceed the total content thereof to be contained in the resulting polymer.

In the post-treatment of the resulting fluorine-containing polymer, for example, before or after the step of drying the fluorine-containing polymer or during the extrusion step, even when using the compound containing the alkali metal or alkali earth metal, the amount must be controlled so that the total amount of the alkali metal or alkali earth metal in the fluorine-containing polymer is within the above defined range.

More preferably, the total content (ppm) of the alkali metal or alkali earth metal in the fluorine-containing polymer does not exceed the value obtained by calculating from the melt flow rate (MFR) (g/10 min., ASTM D2116) at 372°C according to the formula (5):

$$1.3 \times e^{0.125(MFR)} + 2 \qquad (5)$$

and exceeds the value obtained by calculating according to the formula (6):

$$0.7 \times e^{0.125(MFR)} \qquad (6)$$

Specific examples of the alkali metal or alkali earth metal include hydroxides such as potassium hydroxide or sodium hydroxide, carbonate salts such as potassium carbonate or calcium carbonate, sulfate salts such as potassium sulfate, or nitrate salts such as potassium nitrate.

The fluorine-containing polymer of the present

invention does not substantially have unstable terminal groups.

Preferably, $-CF_2H$ accounts for at least half of polymer chain terminals and substantially all polymer chain terminals comprise $-CF_2H$, or $-CF_2H$ and $-CH_3$. As used herein, the expression "does not substantially have unstable terminal groups" refers to the state that the number of unstable terminal groups such as COOH, -COF and $-CF=CF_2$ is at most 20 per 10^6 carbon atoms of the polymer.

When the fluorine-containing polymer is a tetrafluoroethylene/hexafluoropropylene copolymer (FEP), a tetrafluoroethylene/perfluorovinyl ether polymer (PFA), a copolymer of tetrafluoroethylene/hexafluoropropylene/perfluoroalkyl vinyl ether, or a copolymer of tetrafluoroethylene, perfluoromethyl vinyl ether and perfluoroalkyl vinyl ether having alkyl other than methyl, such as perfluoropropyl vinyl ether, it may have a melt viscosity of 0.1 to 100 kPa·s at 372°C.

The coated electric wire or cable can be produced in the same method of producing an electric wire and cable by coating with a conventional fluororesin, except that the fluorine-containing polymer described above is used as the coating material.

The kind of the electric wire or cable is not specifically limited. The core wire may be a single core,

a strand wire, or a coaxial cable. In the case of the coaxial cable, the fluorine-containing polymer used in the present invention can also be used as an internal insulating material.

PREFERRED EMBODIMENTS OF THE INVENTION

The following Examples and Comparative Examples further illustrate the present invention.

Physical properties were determined by the following procedures.

(1) Melt flow rate (MFR)

A melt flow rate (g/10 min.) was measured at 372°C in accordance with ASTM D2116.

(2) Dielectric dissipation factor

A dielectric dissipation factor was measured by a standing wave method using a coaxial cable in accordance with ASTM D2520.

Example 1

By the emulsion polymerization method (polymerization pressure: 4.2 MPa, polymerization temperature: 95°C, initiator: ammonium persulfate (APS), emulsifier: $C_7F_{15}COONH_4$), a tetrafluoroethylene/hexafluoropropylene copolymer (hexafluoropropylene content: 10.0% by weight, MFR = 5) was polymerized and then coagulated by adding nitric acid after the polymerization. After dehydration and drying, an 1 wt% aqueous potassium carbonate solution was added to the

polymer so that a potassium content was 4 ppm (the amount was measured by atomic adsorption spectrometry). After dispersing by a powder mixer, the dispersion was dried again and extruded into pellets in a twin-screw extruder. During the extension, water and air were fed (extrusion amount: 50 kg/hour, water: 5.5 kg/hour, air: 50 NL/min.) in the extruder to stabilize polymer terminals by the wet heat treatment.

The structure of the polymer terminals after the treatment was analyzed by a Fourier transform infrared spectroscopy. As a result, those other than $-CF_2H$ terminal groups were not detected.

The dielectric dissipation factor was measured at 500 MHz. As a result, it was 6.10×10^{-4}.

Example 2

In the same manner, the dielectric dissipation factor of a tetrafluoroethylene/hexafluoropropylene copolymer (hexafluoropropylene content: 12.0% by weight, MFR = 10), which was obtained in the same manner as in Example 1 except that the proportion of the monomer was changed and the content of potassium was changed to 6 ppm, was measured. As a result, it was 6.53×10^{-4}.

Comparative Example 1

The dielectric dissipation factor of a polymer, which was treated in the same manner as in Example 1 except that the content of potassium was changed to 70 ppm, was measured.

As a result, it was 8.94×10^{-4}.

Comparative Example 2

The dielectric dissipation factor of a polymer, which was treated in the same manner as in Example 2 except that the content of potassium was changed to 100 ppm, was measured. As a result, it was 9.95×10^{-4}.

Example 3

Using a tetrafluoroethylene/hexafluoropropylene copolymer (hexafluoropropylene content: 13.5% by weight, MFR = 17, potassium content: 10 ppm) obtained in the same manner as in Example 1, coated electric wires each having a wire size (core material of copper) of 511 μm (20.1 mil) and a coating thickness of 196 μm (7.7 mil) were produced. These coated electric wires were produced by molding at a rate of 305 m/min (1000 ft/min) using a single-screw extruder having a diameter of 5.1 cm (2 inch).

After standing at room temperature for 10 days, a coated portion was peeled off and a core wire made of copper was visually observed. As a result, discoloration was not observed.

Comparative Example 4

After a coated electric wire produced by using a copolymer which was obtained in the same manner as in Example 3 except that the content of potassium was changed to 90 ppm, was allowed to stand at room temperature for 10 days, a coated

portion was peeled off and a core wire made of copper was visually observed. As a result, partial discoloration (considered to be caused by corrosion of copper) was observed.

(Amended on September 17, 2001)

CLAIMS

1. (amended) A fluorine-containing polymer comprising 70 to 95% by weight of tetrafluoroethylene, 5 to 25% by weight of hexafluoropropylene and 0 to 20% by weight of perfluoroalkyl vinyl ether,
wherein a melt flow rate (MFR) (g/10 min., ASTM D2116) at 372°C is within a range from 0.1 to 100, and
the total content (ppm) of an alkali metal and an alkali earth metal does not exceed the value obtained by calculating from the melt flow rate (MFR) at 372°C according to the formula (1):

$$5.2 \times e^{0.125(MFR)} + 2 \quad (1)$$

and exceeds the value obtained by calculating according to the formula (2):

$$0.35 \times e^{0.125(MFR)} \quad (2), \text{ and}$$

wherein $-CF_2H$ accounts for at least half of polymer chain terminals and substantially all polymer chain terminals comprise $-CF_2H$, or $-CF_2H$ and $-CH_3$.

2. (deleted)

3. An electric wire or cable coated with a fluorine-containing polymer wherein the total content (ppm) of an alkali metal and an alkali earth metal does not exceed the value obtained by calculating from a melt flow rate (MFR)

(g/10 min., ASTM D2116) at 372°C according to the formula (1):

$$5.2 \times e^{0.125(MFR)} + 2 \qquad (1)$$

and exceeds the value obtained by calculating according to the formula (2):

$$0.35 \times e^{0.125(MFR)} \qquad (2), \text{ and}$$

wherein $-CF_2H$ accounts for at least half of polymer chain terminals and substantially all polymer chain terminals comprise $-CF_2H$, or $-CF_2H$ and $-CH_3$.

4. (deleted)

5. The electric wire or cable according to claim 3, wherein the fluorine-containing polymer is a fluorine-containing polymer prepared by emulsion polymerization.

6. (amended) The electric wire or cable according to claim 3 or 5, wherein the fluorine-containing polymer is a copolymer comprising at least two monomers selected from the group consisting of tetrafluoroethylene, hexafluoropropylene and perfluoroalkyl vinyl ether.

7. (amended) The electric wire or cable according to anyone of claims 3, 5 and 6, wherein the contained alkali metal and alkali earth metal comprise at least one of potassium and sodium.

ABSTRACT

Although an electric wire or cable, which is coated with a fluorine-containing polymer comprising tetrafluoroethylene and hexafluoropropylene and, if necessary, perfluoroalkyl vinyl ether, wherein a melt flow rate (MFR) at 372°C is within a range from 0.1 to 100, and the total content (ppm) of an alkali metal and an alkali earth metal does not exceed the value obtained by calculatingt from the melt flow rate (MFR) at 372°C according to the formula (1):

$$5.2 \times e^{0.125(MFR)} + 2 \qquad (1)$$

and exceeds the value obtained by calculating according to the formula (2):

$$0.35 \times e^{0.125(MFR)} \qquad (2)$$

contains the alkali metal or alkali earth metal, electrical characteristics of the coated electric wire are not impaired and a core wire is not corroded.

Attorney Docket No.
0020-4964P

PLEASE NOTE: YOU MUST COMPLETE THE FOLLOWING

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COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT AND DESIGN APPLICATIONS

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert Title: FLUORINE-CONTAINING POLYMER AND ELECTRIC WIRE AND CABLE COATED THEREWITH

Fill in Appropriate Information - For Use Without Specification Attached:

the specification of which is attached hereto. If not attached hereto,
the specification was filed on _____ as
United States Application Number _____;
and amended on _____ (if applicable) and/or
the specification was filed on September 6, 2000 as PCT
International Application Number PCT/JP00/06048; and was
amended under PCT Article ~~19~~ 34 on September 17, 2001 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Insert Priority Information: (if appropriate)

Prior Foreign Application(s)			Priority Claimed	
254188/1999 (Number)	Japan (Country)	September/8/1999 (Month/Day/Year Filed)	☒ Yes	☐ No
(Number)	(Country)	(Month/Day/Year Filed)	☐ Yes	☐ No
(Number)	(Country)	(Month/Day/Year Filed)	☐ Yes	☐ No
(Number)	(Country)	(Month/Day/Year Filed)	☐ Yes	☐ No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional applications(s) listed below.

Insert Provisional Application(s): (if any)

(Application Number)	(Filing Date)
(Application Number)	(Filing Date)

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More than 12 Months (6 Months for Designs) Prior to the Filing Date of This Application:

Insert Requested Information: (if appropriate)

Country	Application Number	Date of Filing (Month/Day/Year)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States and/or PCT application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States and/or PCT application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

Insert Prior U.S. Application(s): (if any)

(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)
(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)

Attorney Docket No.
0020-4964P

I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the attorneys identified below, unless the inventor(s) or assignee provides said attorneys with a written notice to the contrary:

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PLEASE NOTE: YOU MUST COMPLETE THE FOLLOWING:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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